Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
63097		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2004/051314	30.06.2004	01.07.2003

International Patent Classification (IPC) or national classification and IPC

H01L23/538, H01L21/98, H01L21/60, H01L21/68

Applicant

3D PLUS

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/051314

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-13 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. 1-18 as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* _____ received by this Authority on _____

nos.* _____ received by this Authority on _____

☒ the drawings:

sheets 1/6-6/6 as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/051314

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	2-13, 15-18	YES
	Claims	1, 14	NO
Inventive step (IS)	Claims	-	YES
	Claims	1-18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims	-	NO

2. Citations and explanations (Rule 70.7)

1. The application fails to comply with the requirements of PCT Article 6, as claims 1 and 17 are unclear. In claims 1 and 17, the order of the steps is not indicated. Consequently, the subject matter of claim 1 is not novel (cf. paragraph 3.1).

2. Reference is made to the following documents:
D1: EP-A-0 611 129 (GEN ELECTRIC) 17 August 1994
D2: FR-A-2 818 804 (THOMSON CSF) 28 June 2002
D3: US 2002/175400 A1 (GERBER MARK A ET AL) 28 November 2002
D4: US 2003/045030 A1 (HAYASHIDA TETSUYA ET AL) 6 March 2003

3. The present application fails to meet the requirements of PCT Article 33(1), since the subject matter of claims 1 and 14 does not comply with the criterion of novelty as defined by PCT Article 33(2) and the subject matter of claims 1 to 18 does not involve an inventive step as defined by PCT Article 33(3).

CLAIM 1

4. D1 describes a method for interconnecting active and passive components (capacitor 20 and chips 14, column 5, line 38, Fig. 1a; IC chips and passive components, column 7, line 50) provided with pads (contact pads 15, column 5, line 51) for interconnecting same, characterised in that:
- at least one active component and one passive

component are positioned on and attached to a planar substrate, the pads being in contact with the substrate (method for positioning contact pads of a plurality of chips ... on a planar surface, column 1, line 56);

- a polymer film is deposited onto the entire substrate and said components (column 6, lines 52 to 58);
- the substrate is removed (column 7, line 38, separated from substrate 10, figures 1b, 1c);
- the pads are redistributed between the components and/or towards the periphery by means of metal conductors arranged according to a predetermined diagram (column 2, lines 38 to 44), thereby enabling a reconstituted heterogeneous structure to be obtained;
- said structure is heterogeneously thinned (optionally, the embodiment indicated in figures 8a to 8e uses "mechanical grinding", column 15, line 24) by non-selective surfacing of the polymer film and at least one passive component.

4.1 The subject matter of claim 1 is therefore not novel (PCT Article 33(2)).

4.2 Nevertheless, the order of the steps in figure 1 of the present application is not the same as in D1. In the rest of the present report, it is assumed that the order of the steps is the one shown in figure 1.

5. D2, which is considered to be the prior art closest to the subject matter of claim 1, describes (the references between parentheses apply to said document) a method wherein:

- at least one active component and one passive component are positioned on and attached to a planar substrate (page 1, lines 9 to 11), the pads being in contact with the substrate (page 1, lines 18 to 21);
- a polymer film is deposited onto the entire

substrate and said components (page 1, lines 22 and 23);
- the substrate is removed (page 1, line 25);
- the pads are redistributed between the components and/or towards the periphery by means of metal conductors arranged according to a predetermined diagram (page 1, lines 28 to 30).

5.1 Consequently, the subject matter of claim 1 differs from the method as described in D2 in that it includes a thinning step after the pads are redistributed between the components.

5.2 The technical effect of this difference is that thickness of the resulting component is reduced.

5.3 The problem that the present invention is intended to solve can be considered to be that of increasing integration density and improving heat conduction.

5.4 The solution proposed in claim 1 of the present application is not considered inventive (PCT Article 33(3)) for the following reason. According to the description provided in D1, thinning has the same advantages as those mentioned in the present application (cf. column 15, lines 29 to 31). Consequently, to a person skilled in the art, including this feature in the method described in D1 is a routine measure to solve the stated problem.

CLAIM 14

6. D1 describes:
- a thinned heterogeneous component characterised in that it includes a polymer film (substrate 24, figure 8C, made of polymer, column 6, lines 52 to 58) having two substantially planar and parallel surfaces, of which one is polished (mechanically ground rear face) and the other is unpolished (front face);

- and, embedded in said film, at least one active component and one passive component (capacitor 20 and chips 14, column 5, line 38, figure 1a; IC chips and passive components, column 7, line 50), the components having two surfaces, a first surface provided with pads for interconnecting components (contact pads 15, column 5, line 51);
- the pads of all the components are connected by metal conductors forming a planar substrate, in contact with the unpolished surface of said film and a second surface (column 2, lines 38 to 44, no. 26 in figure 1e);
- said second surfaces of all the passive components are polished so as to form a planar surface that is uniform relative to said planar surface of the polymer film (mechanically ground rear surface, column 15, line 24).

6.1 The subject matter of claim 1 is therefore not novel (PCT Article 33(2)).

CLAIM 17

7. D1, which is considered to be the prior art closest to the subject matter of claim 17, describes (the references between parentheses apply to said document) a method for three-dimensionally interconnecting active and passive components provided with pads for connecting same, characterised in that:

- at least one passive component and at least a first active component are positioned on and attached to a planar substrate (capacitor 20 and chips 14, column 5, line 38, figure 1a; IC chips and passive components, column 7, line 50), the pads being in contact with the substrate (contact pads 15, column 5, line 51, figure 1a);
- a polymer film is deposited onto the entire substrate and said components (column 2, lines 18, 19, figure 13);
- the substrate is removed (column 2, lines 31, 32;

figures 3b, 3c);
- the pads are redistributed between the components and/or towards the periphery by means of metal conductors, thereby enabling a reconstituted heterogeneous structure to be obtained (column 2, lines 38 to 44);
- said structure is heterogeneously thinned by non-selective surfacing of the polymer film and the passive components (mechanical grinding, column 15, line 24).

7.1 Consequently, the subject matter of claim 17 differs from this known method in that:
- a pad adapter having mutually connected metal contacts on two surfaces is used, of which one surface is in contact with said substrate and the other faces opposite;
- a second active component is stacked on top of and bonded to said first active component, the pads of said second component being on the surface opposite the one in contact with the first component;
- connections are made between the pads of the second component and the contacts of the adapter by means of connecting wires.

7.2 The technical effect of these differences is that the method is suitable for wire connection and is compact.

7.3 The problem that the present invention is intended to solve can be considered to be that of proposing a method having the above-mentioned advantages.

7.4 The solution proposed in claim 17 of the present application is not considered inventive (PCT Article 33(3)) for the following reasons.

7.5 According to the description provided in D3, the use of a connecting frame has the same advantages as those mentioned in the present application (cf. paragraphs

[002], [015], [016]). Consequently, to a person skilled in the art, including this feature in the method described in D1 is a routine measure to solve the stated problem.

7.6 D3 does not describe a second component being stacked on a first component such that the surfaces of the components are opposite.

7.7 It is nevertheless well known to a person skilled in the art that this feature is equivalent to stacking a second component on a first component such that the surface of one component is on top of the rear surface of the other, as described in D4, and that said feature can be replaced by the latter (cf. D4, figures 20, 21).

DEPENDENT CLAIMS

8. In the light of the documents and passages cited in the international search report, dependent claims 2 to 13, 15, 16 and 18 contain no feature which, when combined with the features of any one of the claims to which they refer, defines subject matter that complies with the PCT requirements of novelty and/or inventive step.